

OLYMPIAD · MENTAL ABILITY · OLYMPIAD PREPARATION · SHORT NOTES

Chapter 4: Direction Sense

Topic-wise short notes with solved examples

Directions, left and right turns, the shadow rule and distance from the starting point using the Pythagoras theorem.

1 The directions

- The four main directions are **North (N)**, **East (E)**, **South (S)** and **West (W)**. Going **clockwise** from north they come in the order N, E, S, W.
- Between them are North-East (NE), South-East (SE), South-West (SW) and North-West (NW).
- A **right turn** is a clockwise turn. A **left turn** is an anticlockwise turn.
- Draw a small cross with N at the top, E on the right, S at the bottom and W on the left. Move on it with your pencil.

You are facing	After a right turn of 90°	After a left turn of 90°	After a turn of 180°
North	East	West	South
East	South	North	West
South	West	East	North
West	North	South	East

Example 1.1 A boy faces east. He turns left, and then turns left again. Which direction is he facing now?

SOLUTION

Facing east, a left turn gives north. Facing north, a left turn gives west.

West

Example 1.2 A girl faces north-west and turns through 90° clockwise. Which direction does she face?

SOLUTION

Clockwise from north-west (NW) is north (N), then north-east (NE). A turn of 90° is two steps of 45° .

North-east

2 The shadow rule

- In the **morning** the sun is in the **east**, so a shadow falls towards the **west**.
- In the **evening** the sun is in the **west**, so a shadow falls towards the **east**.

- At noon the sun is overhead, so the shadow is very short. Questions usually say "morning" or "evening".

Example 2.1 In the morning a boy stands with his back to the sun. In which direction does his shadow fall, and which direction is his right hand?

SOLUTION

The sun is in the east. His back is to the east, so he faces west.

His shadow falls towards the west. Facing west, his right hand points to the north.

The shadow falls to the west and his right hand points north.

3 Distance from the starting point

- Draw the path on paper and label each part. Join the start and the end.
- If the path has two legs at a right angle, the straight-line distance is the hypotenuse: $d = \sqrt{a^2 + b^2}$.
- Opposite legs cancel: 5 km east followed by 5 km west brings you back to the same line.

Example 3.1 Rohan walks 5 km north, turns right and walks 12 km. How far is he from the start, and in which direction?

SOLUTION

After 5 km north, a right turn means east. So he walks 12 km east.

Distance = $\sqrt{5^2 + 12^2} = \sqrt{169} = 13$ km.

13 km, towards the north-east

Example 3.2 Sana walks 4 km east, then 3 km north, then 4 km west. How far is she from the start?

SOLUTION

The 4 km east and 4 km west cancel. She is 3 km north of where she began.

3 km, towards the north

REMEMBER

Do not try to hold the path in your head. Draw it, and write the distance on every line.